CR-178923

C.F.K.

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FINAL REPORT

PRIME CONTRACT NUMBER:	NAS8-35825
SUB CONTRACT NUMBER:	4-84-1-0206
CONTRACT TITILE:	RESEARCH STUDY FOR MATERIALS/PROPERTIES TEST RESULTS DATABASE
AGENCY:	Marshall Space Flight Center, NASA
WORK LOCATION:	SciTek Facilities 6767 Old Madison Pike Huntsville, AL 35806 Materials & Processes Laboratory Bldg. 4612 Marshall Space Flight Ctr., AL
PERIOD ENDING:	February 18, 1986

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(NASA-CR-178923) RESEARCH STUDY FOR MATERIALS/PROPERTIES TEST RESULTS DATABASE Final Report, period ending 18 Feb. 1986 (SciTek Facilities) 38 p CSCL 11H

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I. FINAL REPORT.

A meeting was held at the Materials Laboratory, MSFC/NASA, on February 18, 1986, at 8:00 am. Attending were Frank Key and Genine Sams of MSFC, and Glenn Swaim and Sheila Stewart of SciTek. The following is the final report for the Lubricants Data Base System.

The Lubricants Data Base System was designed and developed by SciTek for operation on the DEC PDP 11/24 Computer. It consists of three data files, Oils, Greases, and Dryfilm. It is accessed by logging on EH02/LUB, then selecting your choice from the menu. The procedures are written in Datatrieve.

The entire Lubricants System was transferred by magnetic tape from the PDP 11/24 computer to the VAX 8600 computer. The Datatrieve Procedures had to be 80% rewritten in order to make them operate on the VAX 8600 computer. A flowchart of this new system is in Appendix A. Compatibility between the two systems is almost non-existent. The three data files are still the same. The record layouts are in Appendix B. After the rewrite of the Lubricants System the data files, record definitions, procedures and programs for LOX/GOX, Aluminum/Steel, Toxic, VCM and Flammability were also moved by magnetic tape to the VAX 8600 computer. The last systems moved to the VAX 8600 <u>are not</u> operational. All of the above mentioned magnetic tapes were labeled (Volume Name) and stored in the tape cabinet in room 2401.

The Lubricants System is operational on both computers. On the VAX 8600 computer, the Lubricants System is a very user friendly system which is menu driven. To activate the Lubricants System a user simply logs on and a message is displayed telling the user that if he wishes to enter the Lubricants System he should push the PF1 key, then Return. A menu will appear (Appendix C) from which he may choose an option to be performed. If he chooses option 13, exit, he will be returned to the dollar $ prompt. If he chooses any one of the others, a message will appear telling him to enter two letters, then pressing return. For an example of each option turn to Appendix C. Any time the user wishes to enter the Lubricants Database System, at the dollar $ prompt he simply presses the PF1 key, then return.

The Lubricants Database contains data from the Midwest Research Book which was supplied by NASA and data supplied by vendors which was obtained by SciTek. Printouts of the Oils, Greases and Dryfilm Databases and printouts of the Lubricants Record Definitions were left with Genine Sams of NASA. There was no requirement for a user manual; however, a set of instructions on the operation of the Lubricants System was supplied to Ms. Sams by SciTek and there are examples included here in Appendix C. Ms. Sams was given a demonstration of the Lubricants System that we developed and was also given a demonstration and a set of instructions on how to make Ad Hoc inquiries into the Lubricants Databases using Datatrieve. If any questions arise in the future, MSFC Personnel were advised to feel free to call SciTek

and we will try to answer any questions.

At the end of this contract the Lubricants System is operational on both the PDP 11/24 and VAX 8600 computers. The LOX/GOX, Aluminum/Steel, Toxic, VCM and Flammability Systems are operational only on the PDP 11/24 computer. The Toxic, VCM, and Flammability Systems do not contain any usable data, only test data. However, the LOX/GOX file does contain test results data supplied by MSFC. All vendor supplied materials were turned over to MSFC Personnel.

II. Problems.

The only major problem encountered while using the VAX 8600 computer was that during execution of a Datatrieve Procedure from a DCL command file, the procedure would execute; however, when a user prompt was executed, the error message "EXECUTION TERMINATED BY OPERATOR" was displayed. When the procedures were executed outside the DCL command file, the prompts work 100%. MSFC Personnel were advised of this problem earlier.

There was also a problem with the printer on the VAX 8600. Often times when trying to print out something, the paper would scroll around the platen instead of feeding out. Eventually the printer would shutdown and the paper would have to be physically torn off the platen therefore destroying the report. MSFC Personnel were advised of this problem also.

III. Estimated Percentage Of Completion.

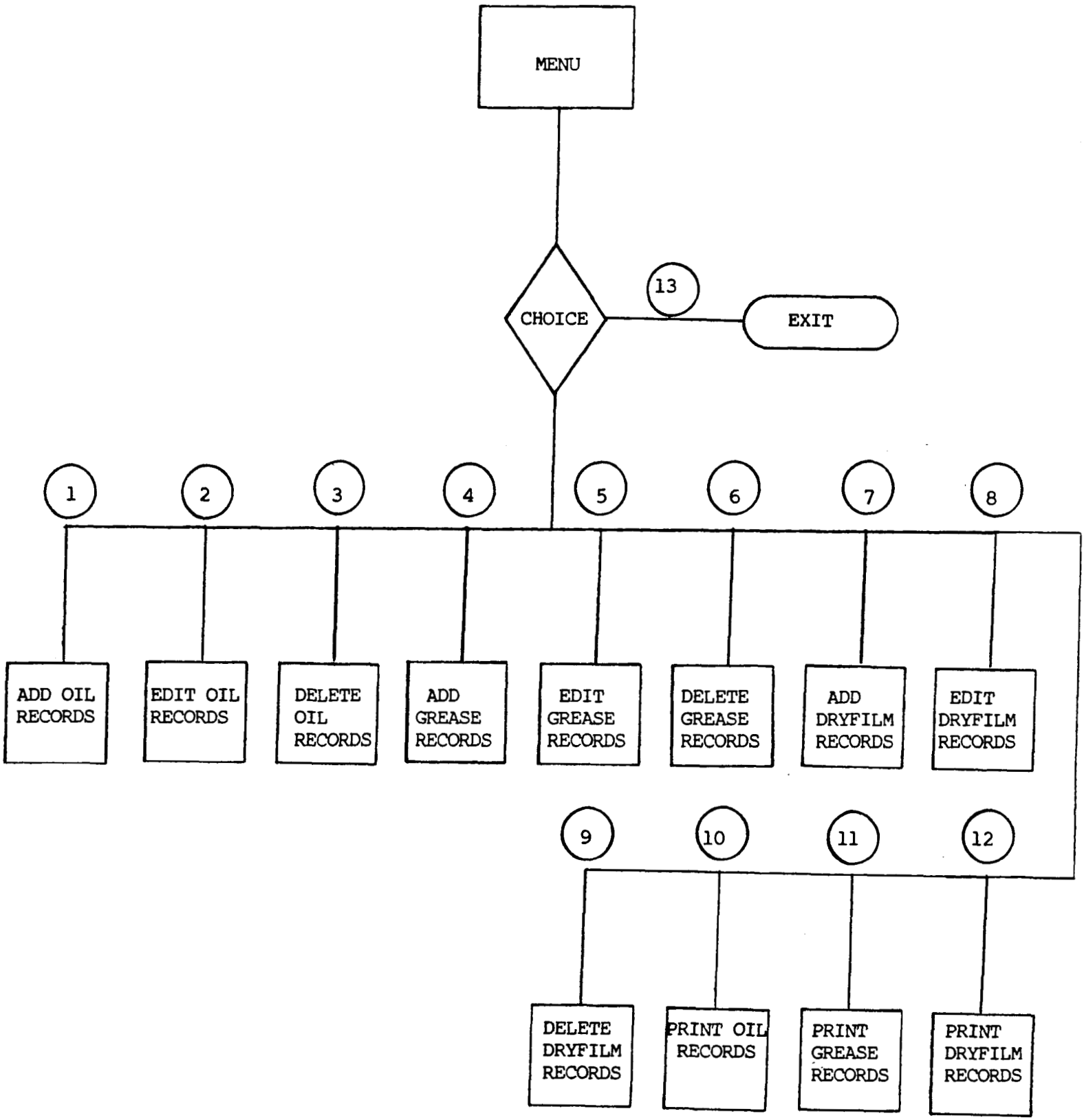
It is estimated that 100% of the total contract effort has been expended.

The total expenditures incurred as of Feb. 1986 are as follows:

Total Current Expenditures	Total Cumulative Expenditures
$13,636.49	$249,997

9% of Modification No.1 was completed in February. The effort under Modification No. 1 is now 100% completed.

APPENDIX A


MENU
CHOICE
13
EXIT
1
2
3
4
5
6
7
8
ADD OIL RECORDS
EDIT OIL RECORDS
DELETE OIL RECORDS
ADD GREASE RECORDS
EDIT GREASE RECORDS
DELETE GREASE RECORDS
ADD DRYFILM RECORDS
EDIT DRYFILM RECORDS
9
10
11
12
DELETE DRYFILM RECORDS
PRINT OIL RECORDS
PRINT GREASE RECORDS
PRINT DRYFILM RECORDS

APPENDIX B

```
01   OIL REC.
     05  TYPE_LUBE                          PIC X(07).
     05  MATERIAL_CODE                      PIC X(06).
     05  MIL_SPEC                           PIC X(15).
     05  SPEC_TYPE                          PIC X(04).
     05  SPEC_CLASS                         PIC X(04).
     05  MANUFACTURER                       PIC X(40).
     05  H4ID                               PIC X(05).
     05  PRODUCT_NAME                       PIC X(40).
     05  COMPOSITION.
         10  BASE_OIL                       PIC X(20).
         10  ADDITIVES OCCURS 5 TIMES.
             15  ADDITIVE                   PIC X(40).
     05  GENERIC_ID                         PIC X(06).
     05  COLOR                              PIC X(06).
     05  DENSITIES OCCURS 4 TIMES.
     05  10  DENSITY_TEMP_F                 PIC X(04).
         10  DENSITY                        PIC X(05).
     05  POUR_POINT_F                       PIC X(04).
     05  VISCOSITIES OCCUR 5 TIMES.
         10  VISCOSITY_TEMP_F               PIC X(04).
         10  VISCOSITY                      PIC X(06).
     05  VISCOSITY_INDEX                    PIC X(04).
     05  TEST_METHOD                        PIC X(15).
     05  SHELL_4_BALL_WEAR.
         10  SHELL_4_BALL_LOAD_KG           PIC X(03).
         10  SHELL_4_BALL_TIME_HR           PIC X(03).
         10  SHELL_4_BALL_TEMP_F            PIC X(04).
         10  SHELL_4_BALL_RESULTS           PIC X(05).
     05  FLASH_POINT_F                      PIC X(04).
     05  GRAVITY_API                        PIC X(05).
     05  SPECIFIC_GRAVITY.
         10  SPECIFIC_GRAVITY_TEMP_F        PIC X(04).
         10  GRAVITY                        PIC X(06).
     05  EVAPORATION.
         10  EVAPORATION_TIME_HR            PIC X(04).
         10  EVAPORATION_TEMP_F             PIC X(04).
         10  EVAPORATION_PCT_WT_LOSS        PIC X(04).
     05  USABLE_LOW_TEMP_F                  PIC X(04).
     05  USABLE_HIGH_TEMP_F                 PIC X(04).
     05  SEAL_COMPATIBILITY                 PIC X(05).
     05  REFRACTIVE_INDEX                   PIC X(05).
```

```
05  CORROSION_RESISTANCE.
    10  CORROSION_TIME_HR                      PIC X(04).
    10  CORROSION_TEMP_F                       PIC X(04).
    10  COPPER_WT_LOSS                         PIC X(04).
    10  ALUMINUM_WT_LOSS                       PIC X(04).
    10  MAGNESIUM_WT_LOSS                      PIC X(04).
    10  STEEL_WT_LOSS                          PIC X(04).
    10  SILVER_WT_LOSS                         PIC X(04).
05  SOLVENT_COMPATIBILITY OCCURS 6 TIMES.
    10  SOLVENT                                PIC X(25).
    10  COMPATIBILITY                          PIC X(04).
05  TEST_YEAR                                  PIC X(04).
05  REFERENCE                                  PIC X(80).
05  REMARKS                                    PIC X(200).
```

```
01   GREASE_REC.
     05  TYPE_LUBE                          PIC X(07).
     05  MATERIAL_CODE                      PIC X(06).
     05  MIL_SPEC                           PIC X(15).
     05  SPEC_TYPE                          PIC X(04).
     05  SPEC_CLASS                         PIC X(04).
     05  MANUFACTURER                       PIC X(40).
     05  H4ID                               PIC X(05).
     05  PRODUCT_NAME                       PIC X(40).
     05  COMPOSITION.
         10  OIL_TYPE                       PIC X(20).
         10  OIL_PCT                        PIC X(04).
         10  THICKENER                      PIC X(20).
         10  THICKENER_PCT                  PIC X(04).
         10  GRAPHITE_PCT                   PIC X(04).
         10  ADDITIVES OCCUR 4 TIMES.
             15  ADDITIVE                   PIC X(20).
     05  GENERIC_ID                         PIC X(06).
     05  COLOR                              PIC X(10).
     05  DENSITIES OCCUR 4 TIMES.
         10  DENSITY_TEMP_F                 PIC X(04).
         10  DENSITY                        PIC X(05).
     05  VISCOSITIES OCCUR 3 TIMES.
         10  VISCOSITY_TEMP_F               PIC X(04).
         10  VISCOSITY                      PIC X(15).
     05  VISCOSITY_INDEX                    PIC X(06).
     05  TEST_METHOD                        PIC X(15).
     05  SHELL_4_BALL_WEAR.
         10  SHELL_4_BALL_LOAD_KG           PIC X(03).
         10  SHELL_4_BALL_TIME_HR           PIC X(03).
         10  SHELL_4_BALL_TEMP_F            PIC X(04).
         10  SHELL_4_BALL_RESULTS           PIC X(05).
     05  SPECIFIC GRAVITY.
         10  SPECIFIC_GRAVITY_TEMP          PIC X(04).
         10  GRAVITY                        PIC X(06).
     05  EVAPORATION.
         10  EVAPORATION_TIME               PIC X(03).
         10  EVAPORATION_TEMP_F             PIC X(04).
         10  EVAPORATION_PCT_WT_LOSS        PIC X(05).
     05  PENETRATION.
         10  PENETRATION_UNWORKED_TEMP_F    PIC X(04).
         10  PENETRATION_UNWORKED           PIC X(10).
         10  PENETRATION_WORKED_TEMP_F      PIC X(04).
         10  PENETRATION_WORKED             PIC X(10).
     05  OIL SEPARATION.
         10  OIL_SEPARATION_TIME            PIC X(03).
         10  OIL_SEPARATION_TEMP_F          PIC X(04).
         10  OIL_SEPARATION_WT_LOSS         PIC X(05).
```

```
05  WATER_RESISTANCE.
    10  WATER_RESISTANCE_TIME                PIC X(03).
    10  WATER_RESISTANCE_TEMP                PIC X(04).
    10  WATER_RESISTANCE_WT_LOSS             PIC X(06).
05  BOMB_OXIDATION OCCURS 2 TIMES.
    10  BOMB_OXIDATION_TIME                  PIC X(03).
    10  BOMB_OXIDATION_PRESS_DROP            PIC X(05).
05  HIGH_TEMP_PERFORMANCE.
    10  HIGH_TEMP_PERFORMANCE_TEMP           PIC X(04).
    10  BEARING_LIFE_HRS                     PIC X(05).
05  LOW_TEMP_TORQUE.
    10  LOW_TEMP_TORQUE_TEMP                 PIC X(04).
    10  STARTING_TORQUE                      PIC X(06).
    10  RUNNING_TORQUE                       PIC X(06).
05  DIRT_CONTENT OCCURS 3 TIMES.
    10  DIRT_CONTENT_DIAMETER                PIC X(03).
    10  PARTICLE_COUNT                       PIC X(06).
05  RUBBER_SWELL.
    10  RUBBER_SWELL_TIME_WKS                PIC X(03).
    10  RUBBER_SWELL_TEMP                    PIC X(04).
    10  VOLUME_INCREASE_PCT                  PIC X(05).
05  STORAGE_STABILITY.
    10  STORAGE_TIME                         PIC X(03).
    10  STORAGE_TEMP                         PIC X(04).
    10  STORAGE_UNWORKED_CHANGE              PIC X(06).
    10  STORAGE_WORKED_CHANGE                PIC X(06).
05  USABLE_LOW_TEMP                          PIC X(04).
05  USABLE_HIGH_TEMP                         PIC X(04).
05  LOAD_CARRYING_CAPACITY                   PIC X(04).
05  COMPATIBILITIES OCCUR 4 TIMES.
    10  COMPATIBILITY_TYPE                   PIC X(30).
    10  COMPATIBILITY                        PIC X(06).
05  TEST_YEAR                                PIC X(04).
05  REFERENCE                                PIC X(80).
05  REMARKS                                  PIC X(200).
```

```
01   DRYFILM_REC.
     05  TYPE_LUBE                          PIC X(07).
     05  MATERIAL_CODE                      PIC X(06).
     05  MIL_SPEC                           PIC X(15).
     05  SPEC_TYPE                          PIC X(04).
     05  SPEC_CLASS                         PIC X(04).
     05  MANUFACTURER                       PIC X(40).
     05  H4ID                               PIC X(04).
     05  PRODUCT_NAME                       PIC X(40).
     05  COMPOSITION.
         10  COMPOSITION_LUBRICANT          PIC X(20).
         10  BINDER_CARRIER                 PIC X(40).
     05  GENERIC_ID                         PIC X(06).
     05  CURE_PROPERTIES OCCUR 3 TIMES.
         10  CURE_TIME_HR                   PIC X(04).
         10  CURE_TEMP_F                    PIC X(04).
         10  CURE_PRESS_PSI                 PIC X(05).
     05  USABLE_LOW_TEMP                    PIC X(04).
     05  USABLE_HIGH_TEMP_F                 PIC X(04).
     05  LOAD_CAPACITY.
         10  LOAD_FORCE_LB                  PIC X(04).
         10  LOAD_TEST_METHOD               PIC X(10).
     05  WEAR_LIFE.
         10  WEAR_LIFE_LOAD_LB              PIC X(04).
         10  WEAR_LIFE_TEST_METHOD          PIC X(10).
         10  WEAR_LIFE_TIME_HR              PIC X(05).
         10  WEAR_LIFE_TEST_CONDITION       PIC X(20).
     05  FRICTION_COEF.
         10  FRICTION_STATIC_AIR            PIC X(13).
         10  FRICTION_STATIC_VCM            PIC X(13).
         10  FRICTION_DYNAMIC_AIR           PIC X(13).
         10  FRICTION_DYNAMIC_VCM           PIC X(13).
     05  SOLVENT_COMPATIBILITY              PIC X(02).
     05  ELECTRIC_CONDUCTIVITY              PIC X(02).
     05  CORROSION_RESISTANCE               PIC X(02).
     05  TEST_YEAR                          PIC X(04).
     05  REMARKS                            PIC X(200).
```

APPENDIX C

```
**********************************************************************
**********************************************************************
**********************************************************************
*                                                                    *
*                                                                    *
*          TO ACCESS THE LUBRICANTS SYSTEM:                          *
*                                                                    *
*          AT THE DOLLAR ($) PROMPT PRESS PF1                        *
*                                                                    *
*          AND THEN THE RETURN KEY.                                  *
*                                                                    *
*                                                                    *
**********************************************************************
**********************************************************************
**********************************************************************
```

$DTR32 EXECUTE LUBESYS

When the user presses the PF1 key at the dollar ($) Prompt "PTR32 execute lubesys" will appear, then he should press return. The Menu will then be displayed on the screen.

```
**********************************************************************
*                                                                    *
* UPON CHOOSING AN OPTION FROM THE FOLLOWING MENU, THE PROPER        *
*    COMMAND WILL BE DISPLAYED THAT IS TO BE USED TO EXECUTE         *
*    THAT PROCEDURE.  AT THE DOLLAR ($) PROMPT, ENTER THE            *
*    COMMAND EXACTLY AS SHOWN AND THEN PRESS THE RETURN KEY.         *
*                                                                    *
**********************************************************************
**********************************************************************
**********************************************************************
**********************************************************************
*                              MSFC                                  *
*                      LUBRICANTS MAIN MENU                          *
*    1.  ADD OIL RECORDS              7.  ADD DRYFILM RECORDS        *
*    2.  EDIT OIL RECORDS             8.  EDIT DRYFILM RECORDS       *
*    3.  DELETE OIL RECORDS           9.  DELETE DRYFILM RECORDS     *
*                                                                    *
*    4.  ADD GREASE RECORDS          10.  PRINT OIL RECORDS          *
*    5.  EDIT GREASE RECORDS         11.  PRINT GREASE RECORDS       *
*    6.  DELETE GREASE RECORDS       12.  PRINT DRYFILM RECORDS      *
*                              13. EXIT                              *
**********************************************************************
**********************************************************************
**********************************************************************

Enter OPTION:
```

If the user chooses option 1 the letters SO will appear. To invoke this option the user has to type in SO, then press return. He will then be asked how many records he wants to store. Upon entering a number other than 0, then pressing return, he will be prompted for each field. For any field that he does not want to enter data into he presses the space bar, then return, else type in the data for each field and press return. If the user entered 0 for the number of records to be stored he will be returned to the dollar ($) prompt.

```
Enter OPTION:1
SO
$SO
Enter NUMBER OF RECORDS YOU WANT TO STORE:1
Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter BASE_OIL:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter GENERIC_ID:
Enter COLOR:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter POUR_POINT_F:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
```

```
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_INDEX:
Enter TEST_METHOD:
Enter SHELL_4_BALL_LOAD_KG:
Enter SHELL_4_BALL_TIME_HR:
Enter SHELL_4_BALL_TEMP_F:
Enter SHELL_4_BALL_RESULTS:
Enter FLASH_POINT_F:
Enter GRAVITY_API:
Enter SPECIFIC_GRAVITY_TEMP-F:
Enter GRAVITY:
Enter EVAPORATION_TIME_HR:
Enter EVAPORATION_TEMP_F:
Enter EVAPORATION_PCT_WT_LOSS:
Enter USABLE_LOW_TEMP_F:
Enter USABLE_HIGH_TEMP_F:
Enter SEAL_COMPATIBILITY:
Enter REFRACTIVE_INDEX:
Enter CORROSION_TIME_HR:
Enter CORROSION_TEMP_F:
Enter ALUMINUM_WT_LOSS:
Enter MAGNESIUM_WT_LOSS:
Enter STEEL_WT_LOSS:
Enter SILVER_WT_LOSS:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter TEST_YEAR:
Enter REFERENCE:
Enter REMARKS:
$
```

When the user chooses option two, the letters EO appear. Upon entering EO and pressing return he will be asked the Product_Name to modify. If the record is found the four fields shown below will be displayed and the user will be asked if he wishes to modify this record. If he selects Y, he will be prompted for each field in the record. For any field he does not want to change he simply presses the Tab key, then return. If the user enters N at the modify this record prompt, or the Product_Name he enters cannot be found the system returns him to the dollar ($) prompt. To try again just enter EO then return.

```
Enter OPTION:2
EO
$EO
Enter PRODUCT-NAME TO MODIFY:  AEROSHELL FLUID 12

TYPE      MATERIAL      MIL              PRODUCT
LUBE      CODE          SPEC             NAME

OIL                     MIL-L-60B5A      AEROSHELL FLUID 12

Enter MODIFY THIS RECORD? [Y/N]:Y
HIT TAB THEN RETURN FOR ANY FIELD NO MODIFY
Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter BASE_OIL:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter GENERIC_ID:
Enter COLOR:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
```

```
Enter DENSITY:
Enter POUR_POINT_F:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_INDEX:
Enter TEST_METHOD:
Enter SHELL_4_BALL_LOAD_KG:
Enter SHELL_4_BALL_TIME_HR:
Enter SHELL_4_BALL_TEMP_F:
Enter SHELL_4_BALL_RESULTS:
Enter FLASH_POINT_F:
Enter GRAVITY_API:
Enter SPECIFIC_GRAVITY_TEMP-F:
Enter GRAVITY:
Enter EVAPORATION_TIME_HR:
Enter EVAPORATION_TEMP_F:
Enter EVAPORATION_PCT_WT_LOSS:
Enter USABLE_LOW_TEMP_F:
Enter USABLE_HIGH_TEMP_F:
Enter SEAL_COMPATIBILITY:
Enter REFRACTIVE_INDEX:
Enter CORROSION_TIME_HR:
Enter CORROSION_TEMP_F:
Enter ALUMINUM_WT_LOSS:
Enter MAGNESIUM_WT_LOSS:
Enter STEEL_WT_LOSS:
Enter SILVER_WT_LOSS:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter SOLVENT:
Enter COMPATIBILITY:
Enter TEST_YEAR:
Enter REFERENCE:
Enter REMARKS:
$
```

NOTE: You cannot change the Product_Name field. To change you must delete the record, then add it.

If the user chooses option 3 the letters DO appear. Upon entering DO, then pressing return, he will be asked to enter the Product_Name to delete. After entering a Product_Name, then pressing return, the four fields shown below will be displayed. The user will then be asked if this is the record that he wishes to delete. When he enters Y the record is deleted. If the record is not found, or if the user enters N at the delete this record prompt, he is returned to the dollar ($) prompt. To try again simply enter the letters DO at the dollar ($) prompt.

```
Enter OPTION:3
DO
$DO
Enter PRODUCT-NAME TO DELETE:  AEROSHELL FLUID 12

TYPE       MATERIAL       MIL              PRODUCT
LUBE       CODE           SPEC             NAME

OIL                       MIL-L-6085A      AEROSHELL FLUID 12

Enter DO YOU WANT TO DELETE THIS RECORD? [Y/N]:Y
$
```

If the user chooses option 4 the letters SG will appear. To invoke this option the user has to type in SG then press return. He will then be asked how many records he wants to store. Upon entering a number other than 0, then pressing return, he will be prompted for each field. For any field that he does not want to enter data into he presses the space bar then return, else type in the data for each field and press return. If the user pressed 0 for the number of records to be stored he will be returned to the dollar ($) prompt.

```
Enter OPTION:4
SG
$SG
Enter NUMBER OF RECORDS YOU WANT TO STORE:1
Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter OIL_TYPE:
Enter OIL_PCT:
Enter THICKENER:
Enter THICKENER_PCT:
Enter GRAPHITE_PCT:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter GENERIC_ID:
Enter COLOR:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_INDEX:
```

```
Enter TEST_METHOD:
Enter SHELL_4_BALL_LOAD_KG:
Enter SHELL_4_BALL_TIME_HR:
Enter SHELL_4_BALL_TEMP_F:
Enter SHELL_4_BALL_RESULTS:
Enter SPECIFIC_GRAVITY_TEMP:
Enter GRAVITY:
Enter EVAPORATION_TIME:
Enter EVAPORATION_TEMP_F:
Enter EVAPORATION_PCT_WT_LOSS:
Enter PENETRATION_UNWORKED_TEMP_F:
Enter PENETRATION_UNWORKED:
Enter PENETRATION_WORKED_TEMP_F:
Enter PENETRATION_WORKED:
Enter OIL_SEPARATION_TIME:
Enter OIL_SEPARATION_TEMP_F:
Enter OIL_SEPARATION_WT_LOSS:
Enter WATER_RESISTANCE_TIME:
Enter WATER_RESISTANCE_TEMP:
Enter WATER_RESISTANCE_WT_LOSS:
Enter BOMB_OXIDATION_TIME:
Enter BOMB_OXIDATION_PRESS_DROP:
Enter BOMB_OXIDATION_TIME:
Enter BOMB_OXIDATION_PRESS_DROP:
Enter HIGH_TEMP_PERFORMANCE_TEMP:
Enter BEARING_LIFE_HRS:
Enter LOW_TEMP_TORQUE_TEMP:
Enter STARTING_TORQUE:
Enter RUNNING_TORQUE:
Enter DIRT_CONTENT_DIAMETER:
Enter PARTICLE_COUNT:
Enter DIRT_CONTENT_DIAMETER:
Enter PARTICLE COUNT:
Enter RUBBER_SWELL_TIME_WKS:
Enter RUBBER_SWELL_TEMP:
Enter VOLUME_INCREASE_PCT:
Enter STORAGE_TIME:
Enter STORAGE_TEMP:
Enter STORAGE_UNWORKED_CHANGE:
Enter STORAGE_WORKED_CHANGE:
Enter USABLE_LOW_TEMP:
Enter USABLE_HIGH_TEMP:
Enter LOAD_CARRYING_CAPACITY:
Enter COMPATIBILITY_TYPE:
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter TEST_YEAR:
Enter REFERENCE:
Enter REMARKS:
$
```

When the user chooses option 5, the letters EG appear. Upon entering EG and pressing return he will be asked the Product_Name to modify. If the record is found the four fields shown below will be displayed and the user will be asked if he wishes to modify this record. If he selects Y, he will be prompted for each field in the record. For any field he does not want to change he simply presses the TAB key, then return. If the user enters N at the modify this record prompt, or the Product_Name he enters cannot be found, the system returns him to the dollar ($) prompt. To try again just enter EG then return.

```
Enter OPTION:5
EG
$EG
Enter PRODUCT-NAME TO MODIFY:  ANDEROL L-762

TYPE        MATERIAL        MIL             PRODUCT
LUBE        CODE            SPEC            NAME

GREASE                                      ANDEROL L-762
Enter MODIFY THIS RECORD? [Y/N]: Y
HIT TAB THEN RETURN FOR ANY FIELD NO MODIFY

Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter OIL_TYPE:
Enter OIL_PCT:
Enter THICKENER:
Enter THICKENER_PCT:
Enter GRAPHITE_PCT:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter ADDITIVE:
Enter GENERIC_ID:
Enter COLOR:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
```

```
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter DENSITY_TEMP_F:
Enter DENSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_TEMP_F:
Enter VISCOSITY:
Enter VISCOSITY_INDEX:
Enter TEST_METHOD:
Enter SHELL_4_BALL_LOAD_KG:
Enter SHELL_4_BALL_TIME_HR:
Enter SHELL_4_BALL_TEMP_F:
Enter SHELL_4_BALL_RESULTS:
Enter SPECIFIC_GRAVITY_TEMP:
Enter GRAVITY:
Enter EVAPORATION_TIME:
Enter EVAPORATION_TEMP_F:
Enter EVAPORATION_PCT_WT_LOSS:
Enter PENETRATION_UNWORKED_TEMP_F:
Enter PENETRATION_UNWORKED:
Enter PENETRATION_WORKED_TEMP_F:
Enter PENETRATION_WORKED:
Enter OIL_SEPARATION_TIME:
Enter OIL_SEPARATION_TEMP_F:
Enter OIL_SEPARATION_WT_LOSS:
Enter WATER_RESISTANCE_TIME:
Enter WATER_RESISTANCE_TEMP:
Enter WATER_RESISTANCE_WT_LOSS:
Enter BOMB_OXIDATION_TIME:
Enter BOMB_OXIDATION_PRESS_DROP:
Enter BOMB_OXIDATION_TIME:
Enter BOMB_OXIDATION_PRESS_DROP:
Enter HIGH_TEMP_PERFORMANCE_TEMP:
Enter BEARING_LIFE_HRS:
Enter LOW_TEMP_TORQUE_TEMP:
Enter STARTING_TORQUE:
Enter RUNNING_TORQUE:
Enter DIRT_CONTENT_DIAMETER:
Enter PARTICLE_COUNT:
Enter DIRT_CONTENT_DIAMETER:
Enter PARTICLE COUNT:
Enter RUBBER_SWELL_TIME_WKS:
Enter RUBBER_SWELL_TEMP:
Enter VOLUME_INCREASE_PCT:
Enter STORAGE_TIME:
Enter STORAGE_TEMP:
Enter STORAGE_UNWORKED_CHANGE:
Enter STORAGE_WORKED_CHANGE:
Enter USABLE_LOW_TEMP:
Enter USABLE_HIGH_TEMP:
Enter LOAD_CARRYING_CAPACITY:
Enter COMPATIBILITY_TYPE:
```

```
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter COMPATIBILITY TYPE:
Enter COMPATIBILITY:
Enter TEST_YEAR:
Enter REFERENCE:
Enter REMARKS:
$
```

If the user chooses option 6 the letters DG appear. Upon entering DG, then pressing return, he will be asked to enter the Product_Name to delete. After entering a Product_Name, then pressing return; the four fields shown below will be displayed. The user will then be asked if this is the record that he wishes to delete. When he enters Y the record is deleted. After the record is deleted the user is returned to the dollar ($) prompt. If the record is not found, or if the user enters N at the delete this record prompt, he is returned to the dollar ($) prompt. To try again simply enter the letters DG at the dollar ($) prompt.

```
Enter OPTION: 6
DG
$DG
Enter PRODUCT_NAME TO DELETE:  ANDEROL L-762

TYPE       MATERIAL       MIL              PRODUCT
LUBE       CODE           SPEC             NAME

GREASE                                     ANDEROL-L762
Enter DO YOU WANT TO DELETE THIS RECORD? [Y/N]:
$
```

If the user chooses option 7 the letters SD will appear. To invoke this option the user has to type in SD, then press return. He will then be asked how many records he wants to store. Upon entering a number other than 0, then pressing return, he will be prompted for each field. For any field that he does not want to enter data into he presses the space bar, then return, else type in the data for each field and press return. If the user presses 0 for the number of records to be stored he will be returned to the dollar ($) prompt.

```
Enter OPTION:7
SD
$SD
Enter NUMBER OF RECORDS YOU WANT TO STORE:1
Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter COMPOSITION_LUBRICANT:
Enter BINDER_CARRIER:
Enter GENERIC_ID:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter USABLE_LOW_TEMP:
Enter USABLE_HIGH_TEMP_F:
Enter LOAD_FORCE_LB:
Enter TEST_METHOD:
Enter WEAR_LIFE_LOAD_LB:
Enter WEAR_LIFE_TEST_METHOD:
Enter WEAR_LIFE_TIME_HR:
Enter WEAR_LIFE_TEST_CONDITION:
Enter FRICTION_STATIC_AIR:
Enter FRICTION_STATIC_VCM:
Enter FRICTION_DYNAMIC_AIR:
Enter FRICTION_DYNAMIC_VCM:
Enter SOLVENT_COMPATIBILITY:
```

```
Enter ELECTRIC_CONDUCTIVITY:
Enter CORROSION_RESISTANCE:
Enter CORROSION_RESISTANCE:
Enter TEST_YEAR:
Enter REMARKS:
```

When the user chooses option 8, the letters ED appear. Upon entering ED and pressing return he will be asked the Product_Name to modify. If the record is found the four fields shown below will be displayed and the user will be asked if he wishes to modify this record. If he selects Y, he will be prompted for each field in the record. For any field he does not want to change he simply presses the TAB key, then return. If the user enters N at the modify this record prompt, or the Product_Name he enters cannot be found, the system returns him to the dollar ($) prompt. To try again just enter ED then return.

```
Enter OPTION:8
ED
$ED
Enter PRODUCT_NAME TO MODIFY:  LUBRI-BOND M

TYPE       MATERIAL       MIL              PRODUCT
LUBE       CODE           SPEC             NAME

DRYFILM                                    LUBRI-BOND M
Enter MODIFY THIS RECORD? [Y/N]:Y
HIT TAB THEN RETURN FOR ANY FIELD NO MODIFY
Enter TYPE_LUBE:
Enter MATERIAL_CODE:
Enter MIL_SPEC:
Enter SPEC_TYPE:
Enter SPEC_CLASS:
Enter MANUFACTURER:
Enter H4ID:
Enter PRODUCT_NAME:
Enter COMPOSITION_LUBRICANT:
Enter BINDER_CARRIER:
Enter GENERIC_ID:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter CURE_TIME_HR:
Enter CURE_TEMP_F:
Enter CURE_PRESS_PSI:
Enter USABLE_LOW_TEMP:
Enter USABLE_HIGH_TEMP_F:
Enter LOAD_FORCE_LB:
Enter TEST_METHOD:
```

```
Enter WEAR_LIFE_LOAD_LB:
Enter WEAR_LIFE_TEST_METHOD:
Enter WEAR_LIFE_TIME_HR:
Enter WEAR_LIFE_TEST_CONDITION:
Enter FRICTION_STATIC_AIR:
Enter FRICTION_STATIC_VCM:
Enter FRICTION_DYNAMIC_AIR:
Enter FRICTION_DYNAMIC_VCM:
Enter SOLVENT_COMPATIBILITY:
Enter ELECTRIC_CONDUCTIVITY:
Enter CORROSION_RESISTANCE:
Enter CORROSION_RESISTANCE:
Enter TEST_YEAR:
Enter REMARKS:
```

If the user chooses option 9 the letters DD appear. Upon entering DD, then pressing return, he will be asked to enter the Product_Name to delete. After entering a Product_Name, then pressing return the four fields shown below will be displayed. The user will then be asked if this is the record that he wishes to delete. When he enters Y the record is deleted. After the record is deleted the user is returned to the dollar ($) prompt. If the record is not found, or if the user enters N at the delete this record prompt, he is returned to the dollar ($) prompt. To try again simply enter the letters DD at the dollar ($) prompt.

```
Enter OPTION:9
DD
$DD
Enter PRODUCT_NAME TO DELETE:  LUBRI-BOND M

TYPE       MATERIAL       MIL              PRODUCT
LUBE       CODE           SPEC             NAME

DRYFILM                                    LUBRI-BOND M
Enter DO YOU WANT TO DELETE THIS RECORD? [Y/N]:
$
```

If the user enters option 10 the letters PO will appear of the screen. Upon entering the letters PO, then return, there will be a pause and the dollar ($) prompt will reappear. The report has been sent to the printer and will be typed out in the format shown on the next page.

```
PO
$PO
$
```

TYPE-LUBE:OIL PRODUCT-NAME: Y- M4ID: MFG: MONTECATINI EDISON S.P.A.
MAT-CODE: MIL-SPEC: COLOR: TEST-YEAR: 1972
BASE-OIL: ADDITIVES: POUR-POINT: <-10 FLASH-POINT:

GRAVITY-API: SPECIFIC-GRAVITY-TEMP: 77 SPECIFIC-GRAVITY: 1.90 EVAPORATION-TIME-HR: TEMP-F: PCT-WT-LOSS:
CORROSION-RESISTANCE-TIME: TEMP-F: CU-WT-LOSS: AL-WT-LOSS: MG-WT-LOSS: ST-WT-LOSS: SI-WT-LOSS:
USABLE-LOW-TEMP: USABLE-HIGH-TEMP: VISCOSITIES (VISCISITY-TEMP-F/VISCOSITY): 0 76000 VISCOSITY-INDEX: 134
100 514
210 41

TYPE-LUBE:OIL PRODUCT-NAME: YL M4ID: MFG: MONTECATINI EDISON S.P.A.
MAT-CODE: MIL-SPEC: COLOR: TEST-YEAR: 1972
BASE-OIL: ADDITIVES: POUR-POINT: <-30 FLASH-POINT:

GRAVITY-API: SPECIFIC-GRAVITY-TEMP: 77 SPECIFIC-GRAVITY: 1.90 EVAPORATION-TIME-HR: TEMP-F: PCT-WT-LOSS:
CORROSION-RESISTANCE-TIME: TEMP-F: CU-WT-LOSS: AL-WT-LOSS: MG-WT-LOSS: ST-WT-LOSS: SI-WT-LOSS:
USABLE-LOW-TEMP: USABLE-HIGH-TEMP: VISCOSITIES (VISCISITY-TEMP-F/VISCOSITY): 0 12600 VISCOSITY-INDEX: 130
100 166
210 19.6

If the user enters option 11 the letters PG will appear on the screen. Upon entering the letters PG, then return, there will be a pause and the dollar ($) prompt will reappear. The report has been sent to the printer and will be typed out in the format shown on the next page.

```
Enter OPTION: 11
PG
$PG
$
```

TYPE-LUBE:GREASE PRODUCT-NAME: KRYTOX 240 AC MAIC: 05434 MFG: DUPONT

MAT-CODE: MIL-SPEC: COLOR: WHITE TEST-YEAR:

OIL-TYPE: KRYTOX 140 AC OIL-PCT: THICKENER: PCT: GRAP-PCT: ADDITIVES:

SHELL-4-BALL-LOAD-KG: 40 TIME-HR: 1.0 TEMP-F: 400 RESULTS: 1.0

EVAPORATION-TIME: 22 TEMP-F: 300 PCT-WT-LOSS: LOW-TEMP-TORQUE-TEMP: STARTING-TORQUE: RUNNING-TORQUE:

PENETRATION-UNWORKED-TEMP-F: 77 UNWORKED: 274 WORKED-TEMP-F: 77 WORKED: 292

WATER-RESISTANCE-TIME: TEMP-F: 175 WT-LOSS: 1.0 FILTER-SWELL-TIME-WKS: TEMP-F: VOLUME-INCREASE-PCT:

HIGH-TEMP-PERFORMANCE-TEMP-F: BEARING-LIFE-HRS: DIRT-CONTENT (DIAMETER/PARTICLE-COUNT):

STORAGE-STABILITY-TIME: TEMP: UNWORKED-CHANGE: WORKED-CHANGE: BOMB-OXIDATION (TIME/PRESS-DROP): 500 2

OIL-SEPARATION-TIME: 30 TEMP-F: 400 WT-LOSS: 11 LOAD-CARRYING-CAPACITY: USABLE-LOW-TEMP: USABLE-HIGH-TEMP:

VISCOSITIES(TEMP-F/VISCOSITY):

If the user enters option 12 the letters PD will appear on the screen. Upon entering the letters PD, then return, there will be a pause and the dollar ($) prompt will reappear. The report has been sent to the printer and will be typed out in the format shown on the next page.

```
Enter OPTION: 12
PD
$PD
$
```

TYPE-LUB: DRYFILM PRODUCT-NAME: AQUADAG M4ID: 70079 MFG: ACHESON COLLOIDS COMPANY
MAT-CODE: MIL-SPEC: CLASS: GENERIC-ID: TEST-YEAR:
COMPOSITION-LUBRICANT: COLLOIDAL GRAPHITE BINDER-CARRIER: WATER SOLVENT-COMPATABILITY:
WEAR-LIFE-LOAD-LB: TEST-METHOD: TIME-HR: TEST-CONDITION: ELECTRIC-CONDUCTIVITY:
FRICTION-STATIC-AIR: FRICTION-STATIC-VCM: LOAD-FORCE-LB: LOAD-TEST-METHOD:
FRICTION-DYNAMIC-AIR: FRICTION-DYNAMIC-VCM: USABLE-LOW-TEMP-F: USABLE-HIGH-TEMP-F:
CORROSION-RESISTANCE: CURE-PROPERTIES (TIME-HR/TEMP-F/PRESS-PSI):

REMARKS: VENDOR DATA

TYPE-LUB: DRYFILM PRODUCT-NAME: CANADIZING M4ID: 55217 MFG: GENERAL MAGNAPLATE CORP.
MAT-CODE: MIL-SPEC: CLASS: GENERIC-ID: TEST-YEAR: 1972
COMPOSITION-LUBRICANT: PROPRIETARY FILM BINDER-CARRIER: SOLVENT-COMPATABILITY:
WEAR-LIFE-LOAD-LB: TEST-METHOD: TIME-HR: TEST-CONDITION: ELECTRIC-CONDUCTIVITY:
FRICTION-STATIC-AIR: FRICTION-STATIC-VCM: LOAD-FORCE-LB: LOAD-TEST-METHOD:
FRICTION-DYNAMIC-AIR: - FRICTION-DYNAMIC-VCM: USABLE-LOW-TEMP-F: USABLE-HIGH-TEMP-F: 700
CORROSION-RESISTANCE: VG CURE-PROPERTIES (TIME-HR/TEMP-F/PRESS-PSI):

REMARKS:

TYPE-LUB: DRYFILM PRODUCT-NAME: DAG 137 M4ID: 70079 MFG: ACHESON COLLOIDS COMPANY
MAT-CODE: MIL-SPEC: CLASS: GENERIC-ID: TEST-YEAR:
COMPOSITION-LUBRICANT: COLLOIDAL GRAPHITE BINDER-CARRIER: WATER SOLVENT-COMPATABILITY:
WEAR-LIFE-LOAD-LB: TEST-METHOD: TIME-HR: TEST-CONDITION: ELECTRIC-CONDUCTIVITY:
FRICTION-STATIC-AIR: FRICTION-STATIC-VCM: LOAD-FORCE-LB: LOAD-TEST-METHOD:
FRICTION-DYNAMIC-AIR: FRICTION-DYNAMIC-VCM: USABLE-LOW-TEMP-F: USABLE-HIGH-TEMP-F:
CORROSION-RESISTANCE: CURE-PROPERTIES (TIME-HR/TEMP-F/PRESS-PSI):

REMARKS: VENDOR DATA
